"DEVELOPING AND VALIDATING INSTRUCTIONAL STRATEGY IN TEACHING SCIENCE CONCEPTS AMONG SLOW LEARNERS OF SECONDARY SCHOOL STUDENTS"

RESEARCH PROPOSAL

SUBMITTED FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY IN EDUCATION

BY

RESEARCH SCHOLAR

MAHADEVI M HANDRAL

RESEARCH GUIDE

DR.U.K.KULKARNI

PROFESSOR,

DEPT. OF STUDIES IN EDUCATION

K.S.A. WOMEN'S UNIVERSITY, BIJAPUR.

SUBMITTED TO

THE DEPARTMENT OF EDUCATION,

KARNATAKA STATE AKKAMAHADEVI WOMEN'S UNIVERSITY,

VIJAYAPUR-586108

2023

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I.INTRODUCTION:

Science is the systematic study of the structure and behavior of the physical, social, and natural worlds through observation and experimentation. It's key to innovation, global competitiveness, and human advancement. It's important that the world continues to advance the field of science, whether it's finding new cures for cancer and other diseases or identifying and exploring new galaxies.

The Values of Learning Science:

Beyond the potential scientific breakthroughs, there are individual benefits to learning science, such as developing our ability to ask questions, collect information, organize and test our ideas, solve problems, and apply what we learn. Even more, science offers a powerful platform for building confidence, developing communication skills, and making sense of the world around us a world that is increasingly shaped by science and technology.

Science also involves a lot of communication with other people and develops patience and perseverance in children. Finding answers to their countless "why" questions pushes children to research and form their own opinions instead of taking others' for granted. While it's easy to go along with another child's answer or pull out a smartphone and do a quick internet search to know why the leaves fall from the trees, a healthy dose of skepticism can take children farther as they explore the world around them and tackle some of its challenging questions.

Importance of instructional strategy in science:

- Teaching strategies should be used properly in order to create and canalize a positive attitude among children towards learning science right from young age.
- Real-life scenarios involve case studies and ways of analyzing current problems.
- Peer-to-peer teaching, which involves students in their own education.

- Innovative teaching strategies are beneficial because they create a more engaging learning environment.
- By providing various ways for students to interact with the material, these strategies can help them gain a deeper understanding of the subject matter

1.1 SLOW LEARNERS:

Meaning and nature of slow learners:

A person who tends to take longer to understand things than the average Person, or someone who requires multiple explanations before they get a concept. Can occasionally be wrongly accused of being a noob. Slow learners are those Pupils who have limited ability due to different reason in the education process. Slow learner is advance word for "backward" or "mentally retarded" and "Educationally subnormal" (E.S.N.)

A "slow learner" is not a diagnostic category, it is a term people use to describe a student who has the ability to learn necessary academic skills, but at rate and depth below average same age peers. In order to grasp new concepts, a slow Learner needs more time, more repetition, and often more resources from teachers to be successful. A child can be described as a slow learner if his or her thinking skills develop at a notably slower rate than that of his or her peers.

Nature of slow learners:

The following features can be seen from the slow learners

- The child will carry on through the exact same developmental stages as his or her peers but at a comparatively slow rate.
- The child typically has below-average intelligence.
- Slow learners tend to learn slower and are, in most cases, unable to retain what they learn.
- They also have a very short attention span.
- Learning does not happen incidentally for slow learners and they have to be directly taught.
- They cannot link one learning to another unless specifically told.

- They are also unable to apply certain learning or concept in different situations without help – which is why they require rigorous concrete teaching and cannot make do with abstract teaching.

Features of slow learners:

- Functions at ability but significantly below grade level.
- Is prone to immature interpersonal relationships.
- Has difficulty following multi-step directions.
- Lives in the present and does not have long range goals.
- Have few internal strategies (i.e. organizational skills, difficulty transferring and generalizing information.)
- Scores consistently low in achievement tests.
- Works well using material (i.e. labs, manipulative, activities.)
- Has a poor self-image.
- Works on all tasks slowly.
- Masters skills slowly; some skills may not be mastered at all.

Causes for slow learning:

Every behavior has a cause, meaning and significance. The behavioral characteristics of slow learners are symptoms of conditions or some factors present either within the child or outside the child. Slow learning is caused by a variety of factors such as:

1. **Low intellectual abilities** such as subnormal intelligence.
2. **Personal factors such as•** long illness, • long absence from school, • undetected physical defects, • poor cognitive entry characteristics.

3. **Environmental variables such as•** poor home facilities for learning skills, • low quality and quantity of food, • shortage of sleep, • adverse parental attitudes towards education, • poor or inappropriate opportunities in school (large classes), • poor quality of teaching, • choosing inadequate or advanced materials, • incompatibility between home and the school, • Repeated changes of school and consequent changes in teaching styles and content.
4. **Emotional factors such as•** dislike of teacher through classes of personality, • negative parental attitudes to school creating in the child similar adverse attitudes, • feeling of inadequacy, • lack of confidence in self and need to achieve, • Extreme timidity and anxiety giving rise to poor levels of attainment.

Difficulties faced by the slow learners:

Following are the some of the difficulties faced by the slow learners in the process of learning

- Slow learners have attention problems of short memory and they do not remember what they learn.
- Slow learners face problem to develop the interest towards learning process and get bored easily.
- They are unable to the clear the particular concept within particular time.
- They have low intellectual abilities such as sub-normal IQs, some personal factors, psychological factors, environmental factors.
- They have low grasping power
- They have less attention towards the learning.
- They are not comfortable to mingle with others
- They feel guilty comparing to other learners by the effect of this the slow learners they always try to dropout.

1.2 CONCEPT OF TEACHING:

Meaning of teaching:

Attempts have been made to define teaching in terms of teaching as an intended activity, teaching as a narrative activity, and the like. But more definitions are still emerging.

According to Hough and Duncan (1970) Teaching is an activity-at unique professional, rational and humane activity in which one creatively and imaginatively uses himself/herself and his/her knowledge to promote the learning and welfare of others.

Characteristics of teaching:

- The act of instructing in an educational institution,
- The management by an instruction of the teaching-learning situations
- Including Direct interaction between the teacher and the learners,
- Proactive decision-making process of planning, designing and preparing the materials for the Teaching-learning conditions, and
- Post active redirection (evaluation, redesign, and dissemination).

Levels of teaching:

- Memory level: Thoughtless teaching.
- Understanding level: Thoughtful teaching.
- Reflective level: Upper thoughtful level.

1.3 AIMS AND OBJECTIVES OF TEACHING SCIENCE AT SECONDARY SCHOOL LEVEL:

Aims of Teaching Science:

Following are the Aims of teaching Science at secondary level

- To provide the broader objectives of science that is process skill knowledge curiosity etc. among the students.
- To encourage and enable students to develop inquiring minds and curiosity about science and nature.

- To acquire knowledge, conceptual understanding, and skills to solve problems and make informed decisions in scientific contexts.
- To develop skills of scientific inquiry to design and carry out scientific investigations and evaluate scientific evidence to draw conclusions
- To communicate scientific ideas, arguments, and practical experiences accurately in a variety of ways
- To think analytically, critically and creatively to solve problems, judge arguments and make decisions in scientific and other contexts
- To appreciate the benefits and limitations of science and its application in technological developments
- To understand the nature of science and the interdependence of science, technology, and society including the benefits, limitations, and implications imposed by social, economic, political, environmental, cultural and ethical factors
- To demonstrate attitudes and develop values of honesty and respect for themselves, others, and their shared environment.

Objectives:

Following are the Objectives of teaching Science at secondary school level

1. Knowledge
2. Understanding
3. Skills
4. Applications
5. Attitude
6. Interest
7. Appreciation
8. Personality Traits.

1.4 METHODS OF TEACHING SCIENCE:

Following are the important Methods of Teaching Science

- Lecture cum demonstration method
- Inductive and deductive method
- Scientific inquiry method
- Project method
- Laboratory Method
- Heuristic Method
- Activity Method
- Discovery Method
- Observation Method
- Role play Method
- Field Trip Method
- Flipped Learning Method
- Natural Exploration Method

1.5 STRATEGIES OF TEACHING SCIENCE CONCEPTS:

Meaning of concepts:

Concept is a mental representation or an abstract idea that we use to understand and organize the world around us. It is a general notion that summarizes and simplifies complex information or experiences, making it easier to communicate and process. For example, the concept of "love" is an abstract idea that represents a range of emotions and behaviors that people experience in their relationships with others. Similarly, the concept of "justice" represents a set of principles and standards that guide our sense of fairness and equality.

Types of concept:

- Concrete Concepts
- Abstract Concepts
- Formal Concepts
- Natural Concepts
- Social Concepts

- Prototype Concepts
- Exemplar Concepts

1.5.1 Concept formation:

Concept formation is a higher-order mental activity that operates on information processed and stored in memory after being experienced by our sensory organs. This process involves categorizing the data conceptually and applying that knowledge to planning, goal-setting, problem-solving, and reasoning. According to the task demands, these categories are recalled from long-term memory. It is believed that such information is processed by ventral neural pathways that connect the temporal cortex to the visual cortex. Understanding the requirements of task and goal fulfillment is greatly aided by developing concepts and knowledge. Through categorizing, infants and young children develop concepts about things, people, and actions.

1.5.2 Difficulties in science concept formation among Slow learners:

Following are the some of the difficulties faced by the slow learners in the process of learning science concepts:

- Lack of confidence.
- Lack of willingness to approach difficult topic of science.
- Paucity of resource or funding
- Slow learners have short attention span with which they can't concentrate for long time
- They have the problem of short memory and do not remember what they learn.
- They get bored easily and develop no interest towards learning process.
- Low intellectual abilities
- Personal factor
- Emotional factor
- Environmental factor
- Have different in transferring and generalizing.
- Poor reasoning skills are typically delayed.

1.5.3 Strategies of teaching science concepts:

Following are the some of the strategies pointed it out by the Researcher

1. **Project based learning Strategy:**

A project is a problematic act carried to completion a needs natural setting by Stevenson. The basic idea of this method is that pupil can learn a lot of things with help of association and mutual cooperation. This method facilitates purposeful activity through a group of pupil and the pupils will work cooperatively. The pupils work together by forming small groups according to their interest and abilities. The main objectives of this method are learning by doing and learning by leaving together.

Characteristics.

- Driving question, learning goals, scientific practices, collaboration, using technological tools, creating an art fact.
- It includes purposeful and realistic activities that promote learning; students are responsible for planning and executing their learning activities.
- It emphasis leaning through practical application.

Steps:

1. Providing a solution
2. Choosing and proposing the topic
3. Planning
4. Executing
5. Evaluation of project
6. Recording of entire work

Advantages:

- This method facilitates learning by doing and team spirit,
- It promotes the self confidence among the pupils.
- This method provides the pupils training in critical thinking and impartial judgment.
- Dignity of labor is developed.
- it is psychologically sound
- The correlation of the subject is best sought by this method.

Disadvantages:

- This method is time consuming and very expensive and hence the courses cannot be covered within a specified time.
- It is not suitable for all topics.
- Only expert teachers can be successful in using this method.
- The whole syllabus cannot be included in the form of projects.
- It requires well-equipped library and laboratory to carry out any activity.

2. **Enquiry based learning Strategy:**

Inquiry-based learning is a type of active learning that encourages students to ask questions, conduct research, and explore new ideas. This approach to learning helps students develop critical thinking, problem-solving, and research skills.

Inquiry-based learning is a teaching method that encourages students to ask questions and investigate real-world problems. This type of learning has many benefits and can be used in a variety of subject areas.

Characteristics:

- Inquiry-based learning is a student-centered teaching method that encourages students to ask questions and investigate real-world problems.

- In this type of learning environment, students are actively engaged in the learning process and are given the opportunity to explore their natural curiosities.
- This type of learning is often hands-on and allows students to connect what they are learning in the classroom and the real world.
- Inquiry-based learning has been shown to improve critical thinking skills, problem-solving skills, and creativity.

Types:

1. Structured enquiry approach
2. Open ended enquiry
3. Problem bade enquiry
4. Guided enquiry

- encourages the critical learning
- it improves the problem solving skills
- encourages the creativity
- improves the communication skills
- connects the learning through the real world
- helps the students understand complex topics

Disadvantages:

1. It requires the skilled person to teach
2. Some tomes it creates confuse in the concept.

3. **Hands on activities Strategy:**

Hands-on learning is the process of learning by actually doing and experiencing something, rather than just being told about it. The term "hands-on" is used because these activities usually involve the physical use of the hands – for example children might use manipulative such as counting cubes and sorting objects to understand mathematical concepts, rather than just being taught the theory via books or pencil and paper exercises.

Characteristics:

- Hands-on learning is particularly important for young children, as this is how they are programmed to learn.
- Children learn from observing, copying, and experimenting with their hands and body as soon as they are born, and play continues to be the most important way of learning new skills until they reach school age and beyond.
- Hands-on experience or work involves actually doing a particular thing, rather than just talking about it or getting someone else to do it.

Functions:

- Reaching.
- Grasping
- Transporting
- Release

Advantages:

- Hands-on activities helps children to strengthen the muscles of the hand, improve accuracy,
- Learn functional skills that they will use for the rest of their lives.
- Solving problems as a part of math class.
- Completing a lab experiment as a part of a science class.
- Building circuits or working machines as a part of a tech class.
- Recreating a historical document or artifact as a part of history class.

Disadvantages:

- There is no deep learning that is reinforced by the activity. Because of this, they are unlikely to remember much once the quiz or test is past, or at least, we can't be sure what they will remember.

4. **Differentiated learning Strategy:**

Differentiated instruction is a popular and effective teaching strategy that involves reacting to the diverse learning styles in every classroom with adjusted content and processes.

Definitions:

- Carol Ann Tomlinson a reputable thought leader on differentiated instruction, recommends analyzing teaching strategies on a constant basis to respond to needs.
- "Frequently reflect on the match between your classroom and the philosophy of teaching and learning you want to practice. Look for matches and mismatches, and use both to guide you."

Characteristics:

- Strategies like learning stations
- The think-pair-share methods are small ways that you can bring unique learning experiences to students.
- Differentiated instruction and assessment, also known as differentiated learning or, in education, simply, differentiation,
- Is a framework or philosophy for effective teaching that involves acquiring content; processing, constructing, or making sense of ideas.
- Developing teaching materials and assessment measures so that all students within a classroom can learn effectively, regardless of differences in their ability.

Process involves: Content-Process-Product-Effect

Advantages:

- Each child is thought to their learning style
- Each student has individualized learning style and style
- Teacher creativity
- No child left behind

- Flexibility

Disadvantages:

- Tougher workload for teacher
- Time constraints
- Difficult to adopt at different places and Children.

5. **Brain storming Strategy:**

Brainstorming is a group problem-solving method that involves the spontaneous contribution of creative ideas and solutions. This technique requires intensive, freewheeling discussion in which every member of the group is encouraged to think aloud and suggest as many ideas as possible based on their diverse knowledge. According to David's, "Brain Storming is an approach to increase the learner creativity and openness for problem solving.

Characteristics:

- Brain Storming Strategy consists of a problem solving situation in which students are assigned a problem
- They are in asked to discuss any idea which comes to their mind.
- The group is encouraged to provide even unusual suggestion.
- They have to analyze and evaluate the work ability of their own suggestions of the problem

Steps:

1. Selecting the problem.
2. Collecting the tools.
3. Focus on ideas
4. Narrow down your list.
5. Presenting the findings.

Advantages:

- Provides a quick and easy class activity. Brainstorming sessions can be effectively used in the classroom.
- Contributes to classroom collective power.
- Creates a student-centered activity.
- Supports learning in a relaxed environment.
- Strengthens problem-based learning.
- Encourages creative thought.

Disadvantages:

- It is time consuming, total contents cannot be covered in stipulated time.
- Teacher has to be well trained to apply this method in the classroom learning process.
- The lack of allied martial / teaching aid also creates hurdle for inquiry based method of teaching.

6. Problem solving Strategy:

It is a method or strategy in which a specific problem is given to the students and they are required to find out the solution through objective reasoning and thinking. This method is highly suitable for teaching of science. In this method teacher is going to act as a guide and will be in the background and the students should take active participation in finding out the solution to the problem.

Characteristics:

- Defining a problem
- Determining the cause of the problem
- Identifying, prioritizing
- Selecting alternatives for a solution
- Implementing a solution.

Steps:

The following steps are involved in the problem solving Strategy.

1. Recognizing the problem
2. Defining and interpreting the problem
3. Collecting data related to the problem
4. Organizing and evaluating the data of problem
5. Arriving at final conclusion
6. Verifying the result

Advantages:

- The students will get training in the art of solving a problem in actual life situations
- Reflective thinking and the power of reasoning can be developed.
- Self-confidence among the students can be developed through this method
- It helps the students in developing the power of critical judgment as they have to think a lot to arrive at correct solution to the problem through practice
- It inculcates the habit of open-mindedness and tolerance.

Disadvantages:

- It is difficult for the teachers to organize the content of science according to the need of the students and therefore, he cannot always give real life problems.
- It is a time-consuming process

7. Cooperative Learning Strategy:

Students work together in small groups and learn through interaction with each other while the teacher coaches the process.

- Is where teams of students, with various abilities and skills, work together on different activities to learn about a subject.
- Groups will stay together for weeks, months or years.
- Groups should be 2-5 people in size.

8. Concept formation and Concept Attainment Strategy:

Environment is so tremendously diverse and we are able to discriminate so many different objects, but in order to cope with the environment we engage in the process of categorization. The term concepts are symbolic construction that represents some common and general features of objects or events. We form categories of objects/ events on the basis of their common characteristics, these categories are known as *CONCEPTS*.

Webster Dictionary: Concept is a thought or an opinion or a mental image of the thing formed by a generalization from particulars, also an Idea of what a thing in general is to be. CAM is a teaching strategy to teach concepts.

According to *BRUNER any concept is having Five elements*

- *Name of the concept*
- *Examples (+ve and –ve)*
- *Attributes (essential and non essential)*
- *Attributes value*
- *Rule*

Understanding the concept means knowing all the elements of the concept

1) Name: Name is a term given to a category for ex: fruits, Dog, Govt. triangles etc.,
2) Examples: +Ve & -Ve examples are helpful to discriminate the thing.
3) Attributes: Means common features are characteristics of a thing.
4) Attribute Value: It explains special features. For ex: Purple colour is the non-acceptable range for an apple and a range of the apple shape (pumpkin)

5) Rule: It reflects successful utilization of other elements of concept. i.e. +ve and –Ve examples and non –essential and essential attributes.

1.6 NEED AND SIGNIFICANCE OF THE PRESENT STUDY:

Activity based Instructional strategy is the one of the important strategy of teaching science. It plays a significant role basically in the development of scientific attitude among the slow learners of secondary school students which is very much lacking nowadays.

It develops important process of skills in science concept formation among the slow learners such as observation, classification, comparison, drawing conclusion, reasoning arranging and handling the apparatus and conducting the experiment, drawing the figures, labeling the parts, reading the scales, recording and reporting the inference, problem solving ability, enquiry skills, thinking in divergently, making necessary interpretation and arriving at conclusion.

SIGNIFICANCE OF THE STUDY:

This study experiences situation and develops scientific sensibility, scientific awareness and scientific outlook among the students. There is need for this strategy for teaching in secondary schools especially for the students of slow learners because the students are shown concrete things; they will not be allowed to have false imagination. Teaching is aimed performance by the students in the concepts learning and not at all rote learning of the subject matter.

1.7 OBJECTIVES OF THE STUDY:

Following are the objective of the present study

- To develop and validating the Instructional strategy to teach science concepts among slow learners of secondary school of 9^{th} standard students.

- To study the effectiveness of Instructional strategy (1. Project based learning, 2.Enquiry based learning, 3.Hands on activities, 4.Differentiated learning, 5.Brain storming, 6.problem solving, 7.Cooperative learning and 8. Concept formation and Concept attainment strategy) based on the activity based learning employed during teaching learning process.
- To find and measure the change in the level of achievement of students due to activity based instructional strategy in teaching science concepts among slow learners.
- To judge the effectiveness of instructional strategy on the basis of acquisition competencies in science concepts by the slow learners.
- To validating or evaluating the applicability of Instructional strategy in science concepts among slow learners of secondary school.
- To examine the impact of the instructional strategy by using activity based methods in science concepts on academic achievement due to gender and intelligence.

1.8 LIMITATIONS OF THE STUDY:

Following are the some of the Limitations Identified by the researcher revealed from the reviewing the related literature.

- The study will be restricted to only the slow learners of secondary school that to only for 9th standard students.
- The study will be limited to vijayapur city only.
- The study will be limited to Kannada medium schools only.
- The study will be limited to teaching concepts in science subject (Physics, Chemistry and Biology) only.
- The study will be limited to finding the effectiveness of instructional strategy on Academic achievement of slow learners only.
- The study will be limited to urban school slow learners only.
- The study will be limited to experimental research only.

II RIVIEW OF RELATED LITRATURE:

Review of literature is one of most important steps in the research process. An account of what is already known about particular phenomenon. The knowledge and ideas that have been already established on a topic. A literature review is a description and analysis of literature relevant to a particular field or topic .it gives an overview of what has been said, what are the prevailing theories and hypothesis, what questions are being asked and what methods, methodologies are appropriate and useful.

Kamini (2022) has conducted a research study entitled "Effect of concept mapping and guided discovery instructional strategies on learning outcomes and self-perception of slow learners", Panjab University. In this study main purpose is to examine the effect of concept mapping and guided discovery instructional strategy on learning outcomes and perception of slow learner. The researcher selected sample from 6th standard of government and government aided schools of district SBN Nagar. The study delimited to slow learners only. The nature of the study is experimental method; it is taken under pretest and post testing control group design of 2 experimental group one control group of slow learner. The tool used in this study is drawing a man test (Phatak 1987) for measuring the intelligence level of student. Tools and lesson plans for evaluating the student were developed by the researcher and also self-perception profile for children were developed by Harter (2012) was revalidated by the researcher. The researcher identified the slow learner were evaluating randomly. The experiment was conducted around 38 days, 2 experimental groups, 1 exposed concept mapping instructional strategy and experimental 2 groups was exposed to guided discovery instructional strategy. The control group was taken under conventional teaching method .the data was analyzed descriptive statistics like mean standard deviations, skewness and kurtosis. The researcher found that these strategies were significantly effective in improving academic

achievement in science and guided discovery instructional strategy for better intervention than concept mapping instructional strategy for enhancement of academic achievement in science.

Zakiya sultan h zarzari (2014) has conducted a research study entitled "A study of the effectiveness of Activity based teaching on Academic achievement of 8th standard students in Biological science", Karnataka state Akkamahadevi women's university. In this study the purpose is to study the effectiveness of activity based methods of teaching employed during teaching learning process. And to find and measure the change in the level of achievement of the pupils due to this method of teaching in biological science. The researcher made the pre-test and post-test to controlled and experimental group. In this study the researcher used technique is descriptive statistics. Differential, comparative analysis like mean, SD, T-test ANOVA. The sample of the study is70 students of 8thstd.of shams English medium school Bhatkal. In this the investigator taught to the students by applying traditional method of teaching as well as activity based method of teaching. In this study researcher used the simple random technique. The design of the study involves activity based methods of teaching in biology and researcher has made on treatment to find out the difference in the academic achievements of the students. The activity based methods are demonstration method, microscopic method, specimen method, experimental method and structure function method of science. The result of the study is the academic achievements of the students in the biological science are found to be better to different methods of activity based.

Agarkar, Sudhakar Chandrayya (1987) has conducted a research study entitled **"Developing instructional strategies to overcome difficulties in concept formation in science and mathematics with special reference to socio-economically deprived students", Savitribai Phule Pune University.** In this study the main objective is to find out the problem faced by SC or st students in process of

understanding, retrieval of concepts internalization in science and mathematics at secondary school level. And to develop appropriate remedial measures to overcome the finding problems to facilitate concept formation. In this study the populations of students studying in 8th standard of Bombay city about 1100 of which 500 are nearly belong to backward classes. The sample of school is more are less that 8 these are categories in to slums, industrial worker, and low middle class where represented in the sample this study is based on qualitative feel and tools were used for continually giving feedback like questionnaire, interview, observational record, lecture session. Evaluation made in 2 different ways formative and summative evaluation. The researcher found that student from deprived homes encounter variety of problem in their educational field. problems are three phase lack of learning , lack of crucial educational opportunity and lack power of expression in general and writing skills in particular . These remedial majors are helpful for the student overcome learning difficulties not expensive and not depend critically.

III. DESIGN OF THE STUDY:

3.1 Statement of the problem:

"***DEVELOPING AND VALIDATING INSTRUCTIONAL STRATEGY IN TEACHING SCIENCE CONCEPTS AMONG SLOW LEARNERS OF SECONDARY SCHOOL STUDENTS***"

3.2 Operational terms used in the study:

Following operational Terms will be used in the present study

Instructional strategy:

Instructional strategy is a term will be used in the study for giving special treatment to the experimental Group. It consists of several strategies such as 1. Project based learning strategy; 2.Enquiry based learning strategy, 3.Hands on activities strategy, 4.Differentiated learning

strategy, 5.Brain storming strategy, 6.problem solving strategy, 7.Cooperative learning strategy and 8. Concept formation and Concept attainment strategy.

Concept formation:

It is a higher-order mental activity that operates on information processed and stored in memory after being experienced by our sensory organs. This process involves categorizing the data conceptually and applying that knowledge to planning, goal-setting, problem-solving, and reasoning

Experimental method:

The experimental method involves manipulating one variable to determine if this causes changes in another variable. This method relies on controlled research methods and random assignment of study subjects to test a hypothesis. The scientific method forms the basis of the experimental method

Scientific enquiry:

It refers to the diverse ways in which scientists study the natural world and propose explanations based on the evidence derived from their work. Inquiry-based learning is a type of active learning that encourages students to ask questions, conduct research, and explore new ideas.

3.3 Variables used in the present study:

Following variables are considered in the present study

Type of Variables	**Variables Considered in the study**
Independent variable	**Instructional strategy** ➢ Project based learning strategy; ➢ Enquiry based learning strategy, ➢ Hands on activities strategy, ➢ Differentiated learning strategy, ➢ Brain storming strategy, ➢ Problem solving strategy,

	➢ Cooperative learning strategy ➢ Concept formation and Concept attainment strategy.
Dependent variable	**Academic Achievement In Science**
Moderate variable	➢ gender (Boys and Girls) ➢ Location (Rural and Urban) ➢ Level of Learners(Low and High

3.4 Hypothesis of the present study:

Following are the Research Hypothesis formulated by the researcher keeping in the mind the Objectives of the study.

1. There is significant difference between control and experimental groups with respect to pretest achievement, posttest achievement and gain of pre and posttest achievement scores in science among slow learners of 9th standard students.
2. There is significant difference between control and experimental groups with respect to pretest and posttest and gain of pre and posttest achievement in science among slow learners of Boys and Girls of secondary schools.
3. There is significant difference between control and experimental groups with respect to pretest and posttest and gain of pre and posttest achievement in science among slow learners of rural and urban secondary schools.
4. There is significant difference between control and experimental groups with respect to pretest and posttest and gain of pre and posttest achievement in science among slow learners of Low, and High levels of secondary schools.

3.5 Methodology of the study:

The investigator felt that the **Empirical method** would be the most appropriate one to study the effectiveness of teaching concepts in science among slow learners of secondary school students. The investigator felt that **the experimental research** in which researcher developed instructional strategy will be implemented on slow learners and its effectiveness will be studied by experimental method. ….**quasi experimental design** with pretest, posttest, and nonequivalent Parallel group design will be used as whole and slow learners of 9th standard students will be considered as sample for both control and experimental group.

Experimental design: pretest, posttest, nonequivalent Parallel group design

Experimental group	**Control group**
Pretest- (Achievement in Science)	**Pretest-** (Achievement in Science)
Treatment- (Teaching through Instructional strategy developed by Investigator)	**Treatment-** (Teaching through Conventional method by using 5-E'S model)
Posttest- (Achievement in Science)	**Posttest-** (Achievement in Science)

3.6 Sampling techniques:

Population and sample:

Population: a well-defined collection of objects, units, events, individual or things which are of unique interest to a research investigator is called population. The population of the present will consists of the slow learner students studying in **9th**standard in the schools of vijayapur city.

Sample: sample is that unit of population which possesses all the characteristics of the group from which the sample is drawn.

The sample of the present study will include **100 (50 control and 50 Experimental group)** students of 9th standard to whom **concepts** will taught in science subject with instructional strategy which will be developed by researcher, for experimental group and Conventional teaching (Teaching through 5E's) for Controlled group for 9th standard students of Govt. school in vijayapur city. The **purposive random sampling** technique will be used for the study.

3.7 Selection of the tools:

Following tools will be used in the study

1. Instructional strategy (will be developed by investigator)
2. Achievement Test in Science (will be developed by investigator)
3. Check List (For Identification of Slow learners)

3.8 Statistical techniques to be used:

The following statistical techniques will be used for analysis of data.

1. Mean and standard deviation
2. T test
3. ANOVA
4. Correlation
5. Graphical Representation of Data

3.9 Plan and producer of the study:

Stage I: Assessment phase:

In the first phase of the study, the research investigator will visit the selected school and take the permission from the authority for conduct of experiment. After obtaining the permission the

investigator will identify the slow learners by using checklist. After identifying the slow learners the investigator will administer the Achievement Test in science for 9 standard students. A total 100 Students of 9thstandard Kannada medium, Rural and Urban Boys and Girls of secondary school of vijayapura district will be selected and controlled and experimental group will be formed. After formulation of groups the investigator will conduct pre- test (Achievement in science) will be conducted

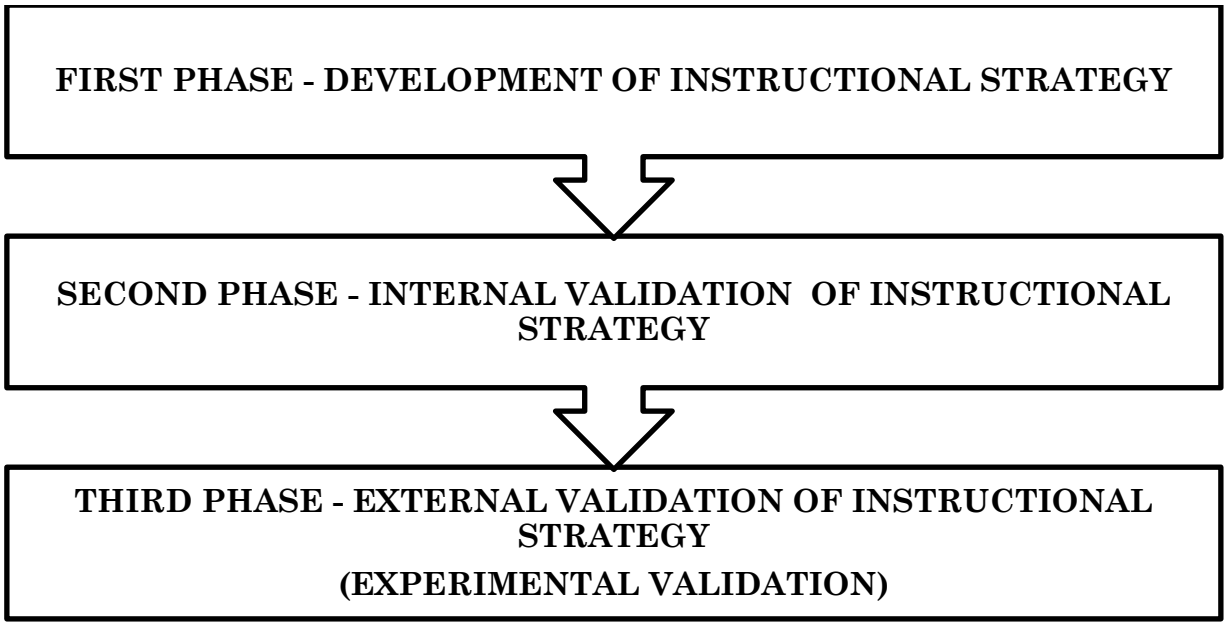
Stage II: Experimental phase:

In the second phase the investigator prepare the Lesson Plans for teaching science concepts for both experimental (Teaching through Instructional Strategy) and controlled group (Conventional Teaching-by using 5-E's Model) of 9th standard students.

Stage III:Validating Phase:

In this stage, the same experimental design group in vijayapur District Secondary schools will be used for post-test and will be seen the effect of developed instructional strategy for teaching science concepts among 9th standard students.

The Development of Instructional Strategy (DIS) research methodology will be adopted by the researcher for the development and validation of Instructional Strategy (VIS) for Teaching Science at Secondary School students of slow learners. Hence for the present study investigator is decided to follow experimental method of research. This Strategy development and validation process will be is as follows;


FIRST PHASE - DEVELOPMENT OF INSTRUCTIONAL STRATEGY
SECOND PHASE - INTERNAL VALIDATION OF INSTRUCTIONAL STRATEGY
THIRD PHASE - EXTERNAL VALIDATION OF INSTRUCTIONAL STRATEGY
(EXPERIMENTAL VALIDATION)

- **PHASE -1: DEVELOPMENT OF INSTRUCTIONAL STRATEGY**

In this phase, the researcher planned to develop the Instructional Strategy. Here, investigator will plan to design the instructional Plan by using following strategy. The structure of the desired package is as follows;

- Project based learning strategy;
- Enquiry based learning strategy,
- Hands on activities strategy,
- Differentiated learning strategy,
- Brain storming strategy,
- Problem solving strategy,
- Cooperative learning strategy
- Concept formation and Concept attainment strategy.

PHASE -2: INTERNAL VALIDATION OF INSTRUCTIONAL STRATEGY

During this second phase, the researcher will plan for the internal validation of instructional Strategy. This will be done against educational experts, teacher educators, in-service teachers' etc..

PHASE -3: EXTERNAL VALIDATION OF INSTRUCTIONAL STRATEGY

In this Phase, the researcher will plan for External validation of instructional Strategy. The External validity will be conducted with experimental tryout.

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